Lesson Plan [Academic Session 2022-2023]

**Class: B. Sc First Year [II Semester] Subject: (CH-106) Organic Chemistry**

Ms. Kirna Devi, Lecturer of Chemistry

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2023** | **Alkenes :** Nomenclature of alkenes, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. **Chemical reactions of alkenes mechanisms involved in**⎯ hydrogenation, electrophilic and free radical additions, Markownikoff’s rule, hydroboration–oxidation, oxymercuration-reduction, ozonolysis, hydration, hydroxylation and oxidation with KMnO4. | Introduction of Syllabus and Course outcomes  Doubt solving sessions Discussion of Previous Years Questions |
| **March,2023** | **Arenes and Aromaticity:** Nomenclature of benzene derivatives: Aromatic nucleus and side chain. **Aromaticity:** the Huckel rule, aromatic ions, annulenes up to 10 carbon atoms, aromatic, anti-aromatic and non-aromatic compounds.  **Aromatic electrophilic substitution** - general pattern of the mechanism, mechanism of nitration, halogenation, sulphonation, and Friedel-Crafts reaction. Energy profile diagrams. Activating, deactivating substituents and orientation. | Assignment on topic: Alkenes  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2023** | **Dienes and Alkynes :** Nomenclature and classification of dienes: isolated, conjugated and ⎯cumulated dienes. Structure of butadiene. Chemical reactions 1,2 and 1,4 additions (Electrophilic & free radical mechanism), Diels-Alder reaction, Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation of alkynes. | Presentation of students  Doubt solving sessions  Discussion of Previous Years Questions |

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| **May, 2023** | **Alkyl and Aryl Halides:** Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanisms and stereochemistry of nucleophilic substitution reactions of alkyl halides, SN2 and SN1 reactions with energy profile diagrams.  Methods of formation and reactions of  aryl halides, The additionelimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions.  Relative reactivities of alkyl halides vs allyl, vinyl  and aryl halides.  **Syllabus Revision** | Discussion of Previous Years Questions  Doubt solving sessions |

**Class: B. Sc First Year [II Semester] Subject: (CH-105) Physical Chemistry**

Ms. Kirna Devi, Lecturer of Chemistry

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2023** | **Kinetics :** Rate of reaction, rate equation and its types, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. Order of a reaction, integrated rate expression for zero order, first order, second and third order reactions. Half life period of a reaction. Effect of temperature on the rate of reaction – Arrhenius equation. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **March,2023** | **Kinetics :** Theories of reaction rate – Simple collision theory for unimolecular collision. Transition state theory of bimolecular reactions.  **Electrochemistry:** Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance and relation among them, their variation with concentration. | Test of Chapter : Kinetics  Discussion on test  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2023** | **Electrochemistry:** Arhenius theory of ionization, Ostwald’s Dilution Law. Debye Huckel – Onsager’s equation for strong electrolytes (elementary treatment only), Application of Kohlrausch’s Law in calculation of conductance of weak electrolytes at infinite dilution. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids determination of solubility product of sparingly soluble salts, conductometric titrations. | Doubt solving sessions  Discussion of Previous Years Questions |
| **May, 2023** | **Electrochemistry:** Concepts of pH and pKa , Buffer solution, Buffer action, Henderson – Hazel equation, Buffer mechanism of buffer action.  **Revision of syllabus** | Discussion of Previous Years Questions |

**Class: B. Sc Second Year [IVSemester] Subject: (CH-203) Organic Chemistry**

Ms. Kirna Devi, Lecturer of Chemistry

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| **Month** | **Topic** | **Academic Activities** |
| **February,**  **2023** | **Amines :** Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabriel phthalimide reaction, Hofmann bromamide reaction.  Electrophilic aromatic substitution in aryl amines, reactions  of amines with nitrous acid. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **March,2023** | **Aldehydes and Ketones:** Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, advantage of oxidation of alcohols with chromium trioxide (Sarett reagent) pyridinium chlorochromate (PCC) and pyridinium dichromate. Physical properties, Comparison of reactivities of aldehydes and ketones. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction.Oxidation of aldehydes, Baeyer– Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, WolffKishner, LiAlH4 and NaBH4 reductions | Test of chapter : Amines  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2023** | **Infrared (IR) absorption spectroscopy:**  Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds. | Doubt solving sessions  Presentation of students  Discussion of Previous Years Questions |
| **May, 2023** | **Diazonium Salts**: Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO2 and CN groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application.  **Revision of Syllabus.** | Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2022-2023] Class: B. Sc Second Year [IV Semester] Subject: (CH-205) Physical Chemistry**

Ms. Kirna Devi, Lecturer of Chemistry

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2023** | **Thermodynamics:** Second law of thermodynamics, need for the law, different statements of the law, Carnot’s cycles and its efficiency, Carnot’s theorm, Thermodynamics scale of temperature. Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **March,2023** | **Thermodynamics:** Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy fro m heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, G as criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T. | Assignment on various topics of  Thermodynamics Discussion on Assignment  Doubt solving sessions Discussion of Previous Years Questions |
| **April, 2023** | **Electrochemistry:** Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells. Calculation of thermodynamic quantities of cell reaction (▲G, ▲H & K).  Types of reversible electrodes – metal- metal ion, gas electrode, metal –insoluble salt- anion and redox electrodes. | Class Test of Chemical Equilibrium  Discussion on Test Doubt solving sessions Discussion of Previous Years Questions |
| **May, 2023** | **Electrochemistry:** Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential. Standard Hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, Concentration cells with and without transfe rence, liquid junction potential and its measurement.Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. More stress on numerical problems.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

Lesson Plan

[Academic Session 2022-2023]

**Class: B. Sc Third Year [VI Semester] Subject: (CH-306) Organic Chemistry**

Ms. Kirna Devi, Lecturer of Chemistry

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| **Month** | **Topic** | **Academic Activities** |
| **February,**  **2023** | **Organic Synthesis via Enolates :** Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.  **Heterocyclic Compounds:** Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. | Introduction of Syllabus and Course outcomes Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2023** | **Heterocyclic Compounds:** Introduction to condensed five and six- membered heterocycles. Prepration and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline. | Assignment on Heterocyclic Compounds.  Discussion on Assignment Doubt solving sessions Discussion of Previous Years Questions |
| **April, 2023** | **Amino Acids, Peptides& Proteins:** Classification, of amino acids. Acid-base behavior, isoelectric -amino acids.αpoint and electrophoresis. Preparation of Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid– phase peptide synthesis. Structures of peptides and proteins: Primary & Secondary structure. | Doubt solving sessions Discussion of Previous Years Questions |
| **May,2023** | **Synthetic Polymers:** Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins. Natural and synthetic rubbers.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |